

**Title:**

Retinoic Acid Receptor Overexpression in Human Umbilical Cord-derived Mesenchymal Stem Cells

Authors:

Farnoosh Saraee ,M.Sc^{1,2}, Homa Mohseni Kouchesfahani, PhD¹, Masoud Maleki, PhD³ , Mohsen Sagha, PhD^{2*}

Affiliation:

1. Department of Animal Sciences, School of Life Sciences, University of Kharazmi, Tehran, Iran. 2. Research Laboratory for Embryology and Stem Cells, Department of Anatomical Sciences and Pathology, Faculty of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran. 3. Department of Biology, East Azerbaijan Sciences and Research Branch, Islamic Azad University, Tabriz, Iran

Abstract:

Introduction: Retinoic acid (RA) involves invertebrate morphogenesis, growth and apoptosis through two classes of receptors encoded by six genes; RAR(a, b, g) and RXR(a, b, g). The former utilizes either *all-trans* RA or *9-cis-RA* as ligands, whereas the RXRs utilize only *9-cis-RA*. Using the human umbilical cord derived stem cells (HUCSCs) as an in vitro model of human fetal cells we aimed to evaluate RAR overexpression following to RA treatment. **Methods:** Human umbilical matrix derived mesenchymal stem cells (HUCSCs) were cultured in DMEM + 10% FBS at a density of 1×10^3 /well. Upon adhering, the medium was changed to DMEM containing RA for 4-6 days during which RA refreshed every 2 days. The cells cultured without RA were considered as a control group. Using a combination of flow cytometry, MTT colorimetric assay and conventional RT-PCR techniques, CD markers, cell viability and RAR expression profile of HUCSCs were measured, respectively. **Results:** Flow cytometry analysis clearly indicated 5.4% of HUCSCs co-expressed CD34 and CD45, while 63.7% of cells expressed both CD44 and CD73. 36.5% of cells expressed CD90 compared to 0.05% for CD105. MTT assay also showed that about 60% of HUCSCs' viability decreased at higher doses (10^{-7} – 10^{-5}) of RA compared to control group. RT-PCR analysis also revealed that RAR a and b were upregulated in the RA-treated cells. **Conclusions:** This study clearly shows that the HUCSCs express CD44, CD73 and CD90 and RA in a dose-dependent manner has a cytotoxicity effect on HUCSCs that is mediated by RAR a and b.

Keywords: Human Umbilical Cord-derived mesenchymal Stem Cells, RAR, RXR, Retinoic acid, Cytotoxicity

Tabriz University
of Medical Sciences